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ADDITIONAL REMARKS ON WEST INDIAN GYRINIDÆ

BY GEORG OCHS

Frankfurt a. Main, Germany

In 1924 (American Museum Novitates, No. 125) I published a paper on West Indian Gyrinidæ and at that time believed that our knowledge of the family in that area was pretty complete. Recently, however, through the kindness of Dr. P. J. Darlington, Jr., I have studied a large collection of these beetles from the Antilles and Bahamas in the Museum of Comparative Zoölogy at Harvard College, Cambridge, Mass., and to my great surprise have found four new forms (two species, one variety and one form) from Cuba and Haiti. Moreover, several new records can be added for different species on the different islands.

I take this opportunity of offering my sincere thanks to Dr. Darlington for his kindness in enabling me to work on this interesting material.

Gyrinus rugifer Rég.

Hitherto known from Guadeloupe, Dominica, Puerto Rico and Haiti. Dr. Darlington has found the species in Cuba and Jamaica and added further records from Haiti.

Haiti: La Selle Range, La Visite and vicinity, 5000-7000 feet, Sept. 16-23, 1934; Mt. La Hotte, N. E. foothills, 2000-4000 feet, Oct. 10-24, 1934; Mt. Trou d'Eau, Nov. 19, 1934.

Jamaica: Blue Mts., Whitfield Hall, near 4500 feet, Aug. 13-20, 1934; Cinchona ca. 5000 feet, Aug. 16, 1934; Ocho Rios, Aug. 20-24, 1934; Moneague, Aug. 26, 1934.

Cuba: Santa Clara Prov., Matagua, 2000 feet, Oct. 14, 1927 (Wilson); Cienfuegos, Soledad, June, 1929; Trinidad Mts., Buenos Aires, 2500-3500 feet, May 8-14, 1936; Trinidad Mts., San Blas and vicinity, 1000-3000 feet, May 9, 1936.

Comparison with specimens from Guadeloupe, where the types came from, shows no essential differences in the series from the different localities. Generally male specimens are much smaller in size than the females, but in the series from La Hotte there are single females not surpassing the size of the males, and exceptionally (series from La Visite) males attain the maximum size of females. The punctuation of the elytra mentioned by Regimbart is generally visible only at the tip of the elytra (even under high power); the reticulate area on the elytra of the female varies in extent. The 11th interval (between the 10th and 11th series of punctures) is always smooth, as are also the basal and the apical portions of elytra to a greater or less extent; towards the suture the reticulation usually reaches the third series of punctures, and sometimes passes it.

Dineutus (Cyclinus) americanus L.

In the Cambridge collection are good series from:

CUBA: Soledad, Feb. 22, 1925 (Geo. Salt); Cienfuegos, Soledad, Oct. 27-28, 1926, Nov. 2, 1926, June, 1929, Aug. 2-12, 1934 (Darlington); Trinidad Mts., Hanabanillo Falls, Apr. 30, 1936, and Buenos Aires, 2500-3500 ft., May 8-14, 1936 (Darlington); Rangel Mts., P. de R. Prov., about 1500 ft., Aug. 24, 1936 (id.); eastern Oriente Prov., upper Ovando River, 1000-2000 ft., July 17-20, 1936 (id.); Oriente Prov., Maisi, July 17, 1936 (id.).

JAMAICA: Mandeville (Thomas Barbour); Blue Mts., near 4500 ft., Aug. 13-20, 1934 (Darlington); Ocho Rios, Aug. 20-24, 1934 (id.).

HAITI: Grande Anse (P. R. Uhler); Jérémie (Dr. Weinland); La Hotte, N. E. foothills, 2000-4000 ft., Oct. 10-24, 1934 (Darlington); S. W. Peninsula, Etang Lachaux, under 1000 ft., Oct. 26-27, 1934 (id.).

BAHAMAS: Andros Isl., Apr., 1905, 1 ♀, somewhat doubtful, perhaps not correctly labelled?

From earlier determination work the following records

are to be added: Cuba: Prov. Pinar del Rio, Sierra del Rosario, Rio Las Pozas near la Mulatta (Bierig don., in coll. Ochs). Jamaica: Rio Gohre Canal, 1895 (Carnegie Museum); Castleton Gardens, 500 ft., Jan. 4, 1913 (W. Harris coll., U. S. Nat. Mus.). Puerto Rico: Desengano, Apr., 1924 (Cornell Univ. Coll.); Aguadilla, Jan., 1899 (Aug. Busck coll., U. S. Nat. Museum). Haiti: Suzanne, 1925 (Hofmann coll., U. S. Nat. Museum).

I cannot find essential differences in the specimens of the different series. The species seems to be constant over its range from Guadeloupe to Cuba and Jamaica.

***Dineutus (Cyclinus) carolinus* Lec. subsp. *mutchleri* Ochs.**

Hitherto recorded only from Nassau (Bahamas). The Cambridge collection contains the following series: New. Providence Is. (-Nassau) July, 1904 (Barber); Andros Is., Apr., 1905; and a single female from Cat. I., Arthurs Town, July 5, 1935 (W. J. Clench).

***Dineutus (s. str.) longimanus* Oliv.**

In the Cambridge collection from:

HAITI: Furcy (W. M. Mann); Mt. Basil, to 4700 ft., Sept. 9, 1934 (Darlington); Trou Caiman, Sept. 15-20, 1934 (id.); Mt. La Hotte, N. E. foothills, 2000-4000 ft., Oct. 10-24, 1934 (id.); Mt. La Hotte, Desbarrière, near 4000 ft., Oct. 12-14, 1934 (id.); Miragoane, Oct. 30-Nov. 2, 1934 (id.).

***Dineutus longimanus*, subsp. *cubensis* Ochs 1926**

CUBA: Upper Yara Valley, taken on a shallow river, Oct. 18-28 (L. C. Scaramuzza); Cienfuegos, Soledad, June, 1929 (Darlington); Trinidad Mts., June, 1929 (id.); Trinidad Mts., Hanabanillo Falls, April 30, 1936 (id.); Trinidad Mts., Buenos Aires, 2500-3500 ft., May 8-14, 1936 (id.); Rangel Mts., P. de R. Prov., about 1500 ft., Aug. 24, 1936 (id.); Pico Turquino, S. side, 1500 ft., June 25, 1936 (id.); Oriente Prov., Cobre Range, Loma del Gato, about 3000 ft., July 3-7, 1936 (id.); eastern Oriente Prov., upper Ovando River, 1000-2000 ft., July 17-20, 1936 (id.); eastern Oriente Prov., Mts. N. of Imias, 3000-4000 ft., July 25-28, 1936 (id.). In my collection through the kindness of Mr. Bierig, Habana, from the

Province of Pinar del Rio: Sitio de Inferno and San Vicente, in mountain streams; Sierra del Rosario, Rio las Pozas near la Mulatta.

Dineutus longimanus subsp. *jamaicensis* subsp. nov.

Good series in the Cambridge collection show that specimens from Jamaica are somewhat different from those of Haiti, Puerto Rico and Cuba. They are characterized by rufous anterior legs, testaceous undersurface, upper surface with silky lustre, anterior tibiae of the male with double incurvation.

Type ♂ and numerous paratypes in the Cambridge collection (Type No. 23,058) from Jamaica, Blue Mts., near 4500 ft., Aug. 13-20, 1934 (Darlington), further specimens from Ocho Rios, Aug. 20-24, 1934 (id.); Kingston, Feb. 14, 1928 (id.); Mandeville (A. E. Wight); Castleton, Botanical Garden (Petrunkévitch).

In the males of the Jamaican series the oedeagus is subparallel, about $\frac{2}{3}$ as wide as the lateral lobes in their basal part, apical fifth finely acuminate; sometimes (immature or shrivelled), narrower and slightly attenuated in the middle of the length. In the Haitian specimens the oedeagus is slightly attenuated from the base in basal third, thence subparallel, slender, about $\frac{1}{3}$ as wide as the lateral lobes, apical fourth acuminate. In the Cuban and Puerto Rican specimens the male genitalia are still somewhat different, as described by me (1924, l.c.); in several individuals, however, we meet with abnormal features approaching those of the other races. Also the other racial characters are not constant in every case, but generally the different subspecies are to be distinguished as follows:

	anterior legs	under surface	upper surface	incurvation of anterior tibiae ♂
Haiti	dark rufous	testaceous	metallic	simple
Puerto Rico	rufous	testaceous	metallic	simple
Jamaica	rufous	testaceous	silky	double
Cuba	brownish	infuscated	silky	double

Hatch (1930, Publ. Univ. Oklahoma Biol. Surv. 2, pp. 18-21) placed this species in the subgenus *Cyclinus*. I should,

however, prefer to put it with *Dineutus* s. str., as the large size and the highly developed anterior legs of the males show more affinity with the representatives of the latter subgenus. Hatch, among many other erroneous suppositions, in his publications on the Gyrinidæ, adds in the same paper the statement that spinous elytral apexes are a character entirely lacking in *Dineutus* s. str. He overlooks the fact that in several species from the Madagascar and the Ethiopian region we meet with such a condition, so the spinose elytral apex does not exclude *D. longimanus* from the subgenus *Dineutus* s. str. Moreover, in *D. truncatus* Sharp from Central America, we can recognize the truncature of *D. longimanus* in a moderate form. A profemoral tooth, the presence of which is denied by Hatch for the species, is weakly intimated in large males of *D. longimanus*.

Gyretes vulneratus Aubé

Of this species, which hitherto was represented only by a few specimens in old collections (i.a. Mus. Berlin, Bremen, Senckenberg; types in coll. Dejean), the Cambridge Museum possesses a considerable series, all from Haiti. The specimens in a series from Furcy (W. M. Mann) agree rather well with the ancient ones seen by me, which are perhaps from the same region as Aubé's types. All females are very strongly reticulate on the disc of pronotum and elytra, and on the sides of the latter there are two abbreviate ridges with a short longitudinal depression between them.

Gyretes vulneratus, forma ♀ laevicollis forma nov.

In several series taken in Haiti by Mr. Darlington, most of the females have the disc of pronotum and elytra smooth (reticulation very fine) as in the males, and on the sides of elytra there is no noticeable ridge or depression; only the tips of elytra show a strong reticulation.

Type and several paratypes (type no. M. C. Z. 23,059) from Mt. La Hotte, N. E. foothills, 2000-4000 ft., Oct. 10-24, 1934; further specimens from Mt. La Hotte, Desbarrières, near 4000 ft., Oct. 12-14, 1934 and Tardieu, 3000 ft., Oct. 14, 1934; Camp Perrin, near 1000 ft., Oct. 8-27, 1934; Ennery, near 1000 ft., Sept. 6-11, 1934.

In the last mentioned series there are, besides smooth females, also reticulate female specimens approaching the typical female form with ridges and lateral depression on the elytra. In all these series the size is on the average a little less than in the specimens from Furcy, a yellowish longitudinal spot is more evident on the pygidium, and in the males the anterior tibiae and tarsi are less strongly developed.

The male genitalia in *G. vulneratus* are of a very singular form: the oedeagus is very short and broad, the apical part bent upwards, bottonlike, and joined to the base by a keeled longitudinal ridge.

Chevrolat (1863, Ann. Soc. Ent. France (4) 3, p. 203) mentions *G. vulneratus* from Cuba; perhaps he confused it with the following species.

***Gyretes darlingtoni* sp. nov.**

Length 5-5.5 mm. Oval, hardly elongate, posteriorly attenuate, very convex. Surface shining, black, slightly brassy; lateral margin brownish, very narrow on prothorax and at base of elytra, much wider and more yellowish towards apex of latter; pygidium yellowish, with two short black longitudinal stripes at the base; body beneath rufous, anal segment and epipleurae yellowish. Labrum rufous or yellowish, transverse, anteriorly rounded and brightly ciliated, surface slightly reticulated, posteriorly at the sides deeply punctured and bristly. Clypeus well defined, with dispersed punctures, a narrow anterior margin smooth, posteriorly strongly reticulate, with short transverse meshes. Reticulation less strongly impressed on the head anteriorly and becoming still more superficial towards the vertex, nearly invisible on the prothorax and very fine and most transverse on the elytra; in the ♀ there is a longitudinal area of strongly impressed nearly round meshes on the last $\frac{2}{3}$ of each elytron, on which longitudinal striae are sometimes indistinctly marked. Tomentous border of the prothorax reaching opposite middle of eye anteriorly, obliquely narrowed and hardly half as wide posteriorly; still narrower on the base of elytra, regularly and moderately broadened from the humeral part for about $\frac{2}{3}$ of the length of elytra, thence more strongly bent inwards and reaching the trunca-

ture obliquely at about its inner third; in the ♀ tomentous border of elytra regularly broadened to about $\frac{3}{4}$ of the length of elytra, the last part of the border therefore a little narrower than in the ♂, reaching the truncature less obliquely and slightly convexly curved. Truncature of elytra moderately oblique in the ♂, more oblique and slightly concave in the ♀, exterior angle a little projecting, briefly denticulate, sutural angle broadly rounded, more produced in the ♀. Anterior tibiæ of the ♂ dilated towards the apex, exterior apical angle rounded; anterior tarsi moderately dilated, narrower than the tibiæ, slightly attenuate towards the apex. In the ♀ the anterior tibiæ are less dilated, the tarsi narrower, subparallel. Ædeagus pale yellow, long and slender, about as wide as the lateral lobes, subparallel basally, attenuate in about apical third, apex finely acuminate.

Habitat: Cuba, eastern Oriente, Mts. N. of Imias, 3000-4000 ft., July 25-28, 1936 (Darlington).

Type ♂ and Allotype ♀ (Type no. M. C. Z. 23,060) in the Museum of Comparative Zoölogy at Harvard College, Cambridge, Mass.); paratypes 9 ♂♂, 8 ♀♀. Further specimens, 1 ♂ 1 ♀, from eastern Oriente, upper Ovando river, 1000-2000 ft., July 17-20, 1936 (Darlington) agree with the typical specimens.

A small series however (4 ♂♂, 1 ♀) from the Cobre Range, Oriente Prov., about 3000 ft., July 3-7, 1936 (Darlington) differ by the pygidium being nearly totally black, only the tip yellow (=a. *pygidialis* nov., type no. M. C. Z. 23,061). Also these specimens are a little larger in size, and in the ♀ longitudinal striae are more distinctly marked on the reticulate portion of the elytra.

The new species differs from *Gyretes cubensis* Rég., the only species of *Gyretes* hitherto known from Cuba, by its larger size, broader, less elongate and less vaulted body, yellowish labrum and tip of pygidium, brighter coloured undersurface, sutural angle of elytra and apical exterior angle of anterior tibiae rounded.

Somewhat resembles *G. vulneratus* Aubé from Haiti, but a little smaller in size and differing by the somewhat narrower tomentous border of elytra, the yellow tip of pygidium, rounded exterior apical angle of anterior tibiae, the latter less broadened in the ♂, with narrower anterior tarsi. The

♀ of the new species is easily distinguished from the typical female form of *G. vulneratus* by the lack of strong reticulation on the disc of pronotum and the anterior part of elytra, longitudinal striae are less distinctly marked on the latter and the lateral impression is wanting. The smooth female form of *G. vulneratus* differs from the ♀ of the new species by the lack of any strong reticulation on the elytra except at the tip, darker pygidium, and broader tomentous border of the elytra. Male genitalia are quite different in the two species.

***Gyretes nigrilabris* sp. nov.**

Length 6.25 mm. Broadly oval, posteriorly attenuated, moderately convex. Surface shining, black, slightly brassy; lateral margin brownish and very narrow on the prothorax and at base of elytra, moderately enlarged and more yellowish toward apex of latter; pygidium black; body beneath ferruginous, epipleura yellowish. Labrum black, transverse, anterior margin flatly rounded and with yellow cilia, surface reticulated, base at the sides with some deep punctures bearing bristles. Clypeus well separated, anterior margin dark rufous, reticulated, with dispersed punctures. Reticulation on labrum and clypeus only slightly impressed, with short transverse meshes; strongly impressed on the head anteriorly, meshes becoming rounded and less impressed towards vertex and on disc of prothorax; head and prothorax with dispersed punctures; elytra not punctured, reticulation fine and very transverse in the ♂, much more strongly impressed in the ♀, with short meshes. Tomentous border of prothorax reaching opposite middle of eye anteriorly, diminishing to about $\frac{2}{3}$ of the anterior width towards the base and continued on the elytra, on the latter slightly and regularly enlarged (a little more in the ♀) towards the apex, shortly before the latter the inner outline, which is flatly concave, is curved convexly, thus reaching the truncature nearly perpendicularly. Truncature of elytra oblique and concave in both sexes, outer angle sharp, sutural angle dehiscent, obtusely rounded, more produced in the ♀. Anterior tibiae of the ♂ dilated towards apex, exterior apical angle nearly rectangular, briefly rounded; anterior tarsi moderately dilated, narrower than the tibiae, strongly attenuated

towards apex. In the ♀ the anterior tibiae are less dilated, the front tarsi narrow, subparallel. Ædeagus dark yellow, lateral lobes infuscated apically, median lobe a little broader than the lateral ones, subparallel, slightly enlarged at the beginning of the short triangular acumination of the apex, tip obtusely rounded.

Habitat: Haiti, Furcy (W. M. Mann).

Type ♂ and Allotype ♀ (type No. 23,062) in the Museum of Comparative Zoölogy at Harvard College, Cambridge, (Mass.).

A little larger than *G. vulneratus* Aubé, with which it was associated and which it resembles very much. Easily distinguished, however, by the black labrum, darker under-surface, and body more attenuated posteriorly. Anterior tibiae in the ♂ less triangularly dilated, exterior apical angle less pronounced, front tarsi narrower and more attenuated, genitalia quite different. In the ♀ the prothorax is not strongly reticulate, elytra without lateral depression.

ON THE SYNONYMY OF *ORUSSUS SAYII*
WESTWOOD¹

BY HARRY D. PRATT

Specimens of the genus *Orussus* Latr. are comparatively rare in most insect collections. Therefore it was with some surprise that the author discovered on June 25, 1935, near his summer home in Jacksonville, Vermont, a dead sugar maple (*Acer saccharum*) with at least twenty specimens of *Orussus* on it. *Orussus* has the habit of jumping, almost like a *Haltica*, before flying and then returns often almost to exactly the same spot from which it flew. Collection is most easily made by covering them with a wide-mouth cyanide jar, since they frequently fly out under the side of a net if it is snapped against the side of the tree. Subsequent collecting in 1936 and 1937 has shown that *O. sayii* Westwood emerges as early as May 31 in 1936, while *O. terminalis* Newman persists at least until mid-July.

If Mr. H. E. Burke's article (Proc. Ent. Soc. Wash., 1917, vol. 19: pages 87-88) is correct, and "*Oryssus* is Parasitic" on Buprestidae, then the host is likely to be a species of *Dicerca*, probably *divaricata* Say, since what appears to be this species occurs commonly in the same tree.

Careful examination and dissection of *O. sayii* showed that this species occurred only in the male sex, while *O. terminalis* occurred only in the female. This fact in itself would make one suspicious as to the synonymy of the two, and becomes all the more interesting from a biological viewpoint, since it is a well-known fact that in parasitic Hymenoptera the males usually emerge before the females, the reason apparently being that they can mate with the larger females as the latter emerge, while they are still somewhat teneral and unable to resist the advances of the male. As mentioned earlier, *O. sayii* emerges before *O. terminalis*, usually a week

¹Contribution from the Entomological Laboratory of Massachusetts State College, Amherst, Mass.

earlier. This fact should be significant in declaring the two synonymous.

S. A. Rohwer (Proc. Ent. Soc. Wash., 1917, vol. 19: p. 95) wrote, "We have not yet been able to locate a male to go with this female (*O. terminalis*), and it is possible that the male of the species will have the abdomen entirely black and that it is at present confused under the name *sayii*."

In view of Mr. Rohwer's statement, and judging from some hundred and more specimens collected from a single tree over a period of three years, it seems quite probable that *O. sayii* and *O. terminalis* are the sexes of the same species, which, according to priority, should be called *Orussus sayii* Westwood, since it was described in 1835, while Newman's species was not described until 1838.

It may be of interest here to note that the figure of *Orussus terminalis* in H. H. Ross' "Generic Classification of the Nearctic Sawflies" on plate IX, fig. 169 belongs to *sayii*. According to a letter from Dr. Ross, the specimen does have the abdomen black and would key out to *sayii*.

The synonymy of the species then is as follows:

Oryssus sayii Westwood, Zool. Journ., 1835, vol. 5: p. 440.

Oryssus terminalis Newman, Ent. Mag., 1838, vol. 5: p. 486
(New Synonymy).

Oryssus haemorrhoidalis Harris, Rept. Ins. Mass., 1841: p. 394 (Synonymy by Rohwer, Proc. Ent. Soc. Wash., 1917, vol. 19: p. 95).

NOTES ON NORTH AMERICAN NITIDULIDAE, II: CRYPTARCHA SHUCKARD

BY C. T. PARSONS

Biological Laboratories, Harvard University

The genus *Cryptarcha* embraces many species which are found in all parts of the world. The six species occurring in the United States have apparently two origins. *Cryptarcha ampla*, *grandicollis*, *glabra* and *strigatula* n. sp. are closely related to the numerous Neotropical forms, whereas the smaller *concinna* and *gila* n. sp. are more closely related to the Palaearctic *imperialis* Fabr. and its allies. The apparently two origins are reflected in the two subgenera, which are keyed below.

1. Prosternum broad between the coxæ and extending beyond the middle of the mesosternum; anterior margin of the metasternum transverse or broadly rounded anteriorly; species usually longer than 4 mm.
..... *Cryptarcha* s. str.
2. Prosternum more or less narrow between the coxæ and not extending beyond the middle of the mesosternum; anterior margin of the metasternum acutely rounded anteriorly; species usually shorter than 4 mm.
..... *Lepiarcha* Sharp

Subg. *Cryptarcha* s. str.

This subgenus comprises at least the Palaearctic *strigata*, the North American *strigatula* n. sp., *ample*, *glabra*, and the Neotropical species.

1. Unicolorous above 2.
Elytra with irregular pale fasciæ 3.
2. Apex of prosternal process rounded *ample* Er.
Apex of prosternal process truncate *glabra* Schaef.

3. Apex of prosternal process emarginate *strigata* Fabr.
Apex of prosternal process rounded *strigatula* n. sp.

Cryptarcha ampla Erichson

Cryptarcha ampla Erichson, 1843, in Germar, Zeitschr. Ent.
4: 356.

The color varies from nigro-piceous to testaceous and the size from 4.5 mm. to 7.8 mm. The upper surface may be almost glabrous.

It has been collected at sap of maple and willow, and extends from Quebec to Florida, west to California and Oregon.

Cryptarcha grandicollis Reitter

Cryptarcha grandicollis Reitter, 1875, Verh. Nat. Ver.
Brünn, 13: 118.

This species was described from Venezuela but is recorded from North America by Grouvelle, 1913, Coleopt. Cat., pars 56, p. 179. Dr. R. Jeannel has written that there is no specimen of this species in the Grouvelle collection in Paris; so, until confirmed, its inclusion in the North American list must remain doubtful.

Cryptarcha glabra Schaeffer

Cryptarcha glabra Schaeffer, 1909, Bull. Brooklyn Mus. 1:
375.

This rare species is remarkable for being glabrous above, and in having parallel sides. Since only six specimens are known, their data are given. Huach. Mts., Ariz. VIII. 9 in U. S. N. M. (type): Carr Canyon, Huachuca Mts., Ariz. VII, 7-30 in Cal. Acad. Sci.; 4050 ft., Kits Peak, Rincon, Baboquivari Mts., Ariz. in A.M.N.H.; two from Baboquivari Mts., Ariz., April and August in H. C. Fall collection; San Bernardino Ranch, 3750 ft., Cochise Co., Ariz., August in the writer's collection.

Cryptarcha strigata Fabr.

Cryptarcha strigata Fabr., 1787, Mant. Ins. 1: 51.

This species is here restricted to the Palaearctic fauna. The North American individuals that have previously had

this name are separated below and the differences between the two species are given in the description of *strigatula*.

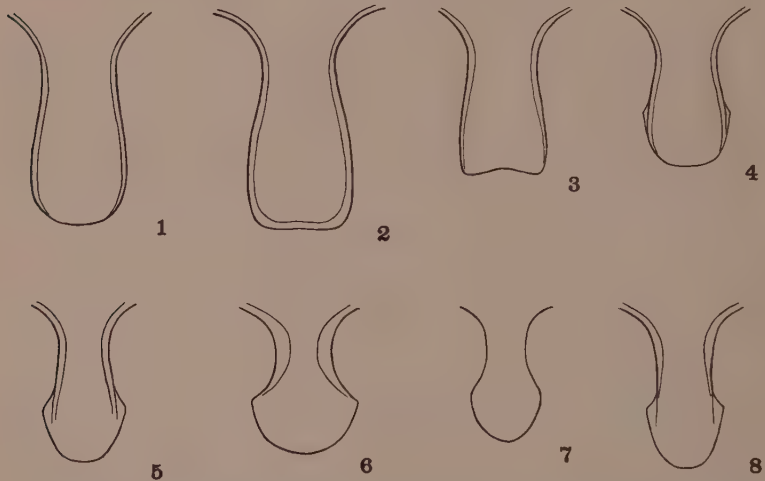


Fig. 1. Ventral views of the prosternal processes in *Cryptarcha*. 1, *C. ampla*; 2, *C. glabra*; 3, *C. strigata*; 4, *C. strigatula* n. sp.; 5, *C. imperialis*; 6, *C. gila* n. sp.; 7, *C. omositoides* (after sketch of B. M. specimen by Dr. H. Scott); 8, *C. concinna*.

***Cryptarcha strigatula* n. sp.**

Cryptarcha strigata auctt. (*partim*).

Cryptarcha concinna Melsh., Reitter, 1873, *nec* Melsh., 1853, Syst. Eintheil. Nitid.: p. 150.

As the name implies this species is a diminutive relative of *strigata*. It is very similar to *strigata*, egg-shaped, piceous, alutaceous, sparsely pubescent, with pale setae irregularly arranged on the pronotum but in seven indistinct rows on each elytron. The two transverse sinuous fasciae are much as in *strigata*, except that the anterior may reach the sutural margin of the elytra. The prosternal process is broadened and emarginate at the tip in *strigata*, but only slightly broadened and rounded at the tip in *strigatula* (figs. 3, 4). The length is 2.7-3.2 mm., whereas the length of *strigata* is 3.2-4.2 mm. The minimum length of *strigata* is from the literature and must be unusual, since the smallest

specimen in the collections of the British Museum and the writer measures 4.0 mm.

Holotype, male, from the Bronx, New York, Aug. 15, 1896, in the writer's collection. Paratypes from Massachusetts, Pennsylvania, New Jersey, Georgia, Illinois in the collections of the Museum of Comparative Zoology, American Museum of Natural History, C. A. Frost, and the writer. Specimens have been seen from as far west as Texas and north to Michigan.

Subg. *Lepiarcha* Sharp

Lepiarcha Sharp, 1891, Biol. Centr. Amer. Col. II, pt. 1: 385
(type *Cryptarcha omositoides* Reitter).

Cryptarchula Ganglbauer, 1899, Käf. Mitteleur. 3: 551
(type *Cryptarcha* (*Cryptarchula*) *imperialis* Fabr.)

This subgenus contains at least the European *imperialis* and its allies, the Central American *omositoides* Reitter, and the following species.

Prosternal process greatly expanded at tip (fig. 6) *gila* n. sp.

Prosternal process only slightly expanded at tip (fig. 8)
concinna Melsh.

Cryptarcha gila n. sp.

Elongate, piceous above, testaceous beneath. The anterior half of head, lateral fourths of the pronotum, epipleurae, and elytral fasciae testaceous. The upper surface closely punctate, finely pubescent, with numerous pale setae. The setae are arranged in eight rows on each elytron. The under surface obsoletely punctate and more sparsely pubescent. The prosternal process expanded, as shown in fig. 6. Anterior and middle coxae pale testaceous. The mandibles are of equal length and notched at tip. Length 2.5-3.3 mm.

Holotype male, allotype, and paratypes from Wheatfields near Globe, Arizona, May 4, 1934, D. K. Duncan, in the collection of the author. Paratypes with similar data in the collection of H. C. Fall. Also paratypes from Bakersfield, Calif. in the E. C. Van Dyke collection of the California Academy of Sciences.

This species is more elongate and a little longer than *concinna*. The apices of the elytra are more pointed than in

omositoides and *concinna*, agreeing in this respect with *imperialis*. The margins of the thorax and the epipleurae are more narrowly reflexed than in *concinna* and more broadly reflexed than in *imperialis*.

Cryptarcha concinna Melsheimer

Cryptarcha concinna Melsheimer, 1853, Cat. of the desc. Col. of U. S., p. 41.

Cryptarcha liturata Leconte, 1863, List Col. of N. Amer. 1: 30.

Cryptarcha picta Melsheimer, 1866, Proc. Acad. Sci. Philadelphia 2: 107.

Cryptarcha bella Reitter, 1873, Syst. Eintheil. Nitid. p. 150.

This is an extremely variable species, but is distinctive in its oval outline, explanate pronotal margins, and shape of the prosternal process as shown in fig. 8. The range of *concinna* is from Massachusetts to Florida, west to southern California and Oregon.

A REVISION OF THE GENUS ZILORA

BY EDITH W. MANK

Lawrence, Mass.

The genus *Zilora* belongs among those Melandryidæ which are characterized by (1) a thorax narrower at the base than the base of the elytra, (2) depressions at the base of the thorax, (3) an abdomen where the first two segments are decidedly longer than the last three.

As represented in the United States, the genus includes beetles with the head short, the antennæ slender, the last segment of the maxillary palpi securiform, at least the posterior part of the lateral edge of the thorax sharp, parallel sided elytra. On the under side, the episternal sutures are present, the anterior coxal cavities have a lateral fissure, the trochantin is visible, the middle coxæ are separated by the mesosternum. The pubescence, except in *Zilora nuda* where all types of erect pubescence are wanting, consists of two kinds. The general pubescence is suberect and plentiful but there are also fine erect hairs in rows, only seen when the specimen is viewed in profile. The erect hairs either form complete rows or are confined to the rear half of the elytra.

Of the American *Ziloras* previously described, the type of *Zilora hispida* Lec. has been examined. The type of *Zilora nuda* Prov. is known to me personally only from description, but specimens of *nuda* in my possession have been compared for me by Mr. N. M. Comeau with the type which is in the Museum at Quebec and they were found to be identical with the type. A specimen labeled as the type of *Zilora canadensis* Hausen is in the Winn collection which is now in the collection at McGill University. Through the kind offices of Mr. G. Chagnon, it has been possible to examine this specimen. The specimen bearing the type label was found to be a *Scotochroa* and not a *Zilora*. It seems probable that the type is lost for this beetle does not have the securiform terminal segment of the palpi, nor the erect hairs mentioned by Hausen himself as present in *Zilora*, nor is the punctuation

of the head and thorax more dense and fine than on the wing covers as he describes it. Moreover, his specimen as he says "seems to be a male, the penis is protruded and bilobed at the extremity." The specimen at McGill is a female.

From the table given below, *Zilora canadensis* Hausen has, therefore, been omitted.

Thanks are due to Mr. Ralph Hopping who placed at my disposal his Ziloras, including long series of *Zilora nuda* Prov. and the new western species, *Zilora occidentalis*; to Mr. P. J. Darlington Jr. of the Museum of Comparative Zoology at Harvard University for access to all the Ziloras in that collection; and to Mr. H. C. Fall for the use of all his material in this genus and for his unfailing advice in the revision of this genus. The types of *Zilora alabamensis* and *occidentalis* are in Mr. Fall's collection.

TABLE OF AMERICAN SPECIES OF ZILORA

- A. Erect pubescence, smooth area margining the eye posteriorly, lateral edge of abdominal segments margined the entire length of the body, male with denser patch of pubescence on the inferior edge of middle and hind femora.
- B. Hind angle of thorax very nearly rectangular, color fusco-castaneous, species of Eastern North America.
- C. Surface of scutellum rough but without well defined round punctures, hind angles of thorax slightly reflexed, narrower compared with length than in *Z. hispida* Lec. The type is from Saraland, Alabama. *alabamensis* n. sp.
- CC. Surface of scutellum showing definite punctures, not rough, hind angles of thorax not reflexed, posterior angles of scutellum, also, not reflexed, body slightly wider compared with the length than in *Z. alabamensis*. The type is from N. H. *hispida* Lec.
- BB. Hind angle of the thorax perceptibly obtuse, color darker than in the above species, from Western coast of North America. The type is from Kern Co., Cal. *occidentalis* n. sp.
- AA. No erect pubescence, no smooth area margining the eye posteriorly, lateral edge of abdominal segments not margined beyond the anterior part of the second segment, area at middle of thorax quite smooth with only a few punctures, terminal segment of maxillary palpi not as large as in the other species of *Zilora*, male without denser patch of pubescence on the inferior edge of middle and hind femora. The type is from Cape Rouge, Quebec. *nuda* Prov.

Zilora alabamensis n. sp.

More slender than *hispida*. Punctures on head coarser

and deeper than in *hispidula*. Eyes bulging, with smooth rim posterior to the eye. Forehead above front flattened.

Thorax finely margined at base; sides sharp clear to front edge although anterior quarter of margin is much less distinct; posterior angles of thorax very nearly rectangular, slightly reflexed. Thorax coarsely punctured, sometimes with cross ridges between punctures over middle part of thorax; two basal impressions not as deep as in *hispidula*. Elytra and thorax with erect and suberect pubescence. Erect pubescence in complete rows. Sides of elytra fairly parallel, rows of punctures poorly defined. Scutellum broad with posterior angles slightly reflexed; punctures on the scutellum not well defined, surface rough, however. On under surface large fissure on the anterior coxal cavity with trochantin plainly visible. Abdomen margined laterally clear to the tip.

Length 6-7 mm.; width 2-2.5 mm.

The type and two other specimens examined were from Saraland, Ala. and were collected by Mr. H. P. Loding of Mobile.

Zilora hispidula Lec.

Head short from antennæ down; membranous piece joining labrum to front; head fairly hairy; punctuation close on front, less so posteriorly; eyes bulging with smooth rim bordering them on the posterior edge. Thorax finely margined at base and laterally more than half way to anterior edge; depressions on basal part of thorax deep and sharply defined; posterior angles of thorax very nearly rectangular, not reflexed; punctuation of thorax fairly close; at base decidedly narrower than the width of the elytra.

On under surface, suture between prosternum and episternum present but flat; lateral fissure present on anterior coxal cavity; trochantin visible. Middle coxae separated by process of the mesosternum. Rows of erect hairs running the length of the elytra. The pubescence both erect and suberect. The pubescence is longer than in the other species, making the specimens look more hairy.

Abdomen margined laterally to the tip.

Length 5-5.1 mm.; width 1.5-2 mm.

The type is marked N. H. Other specimens have been examined marked Mt. Washington.

Zilora occidentalis n. sp.

Punctuation, in general, more sparse than in the eastern forms. Front of head above eyes not as bulging as in *hispida*. Smooth area present posterior to eye. Lateral margin of thorax sharp at least $\frac{3}{4}$ of distance to anterior margin. Hind margin of thorax perceptibly obtuse. Scutellum very finely and profusely punctured. The rows of erect hairs on the elytra confined to apical half. Color darker than in the preceding species. Abdomen margined laterally to the tip.

Length 7.1 mm.; width 2-2.5 mm.

The type is from Kern Co., Cal. Other specimens were examined from Fresno Co., Cal., Seattle, Wash., Trinity Valley, B.C., Merritt, B.C., Pender Harbor, B.C., and Aspen Grove, B.C.

Zilora nuda Prov.

No erect pubescence. No traces of punctures on the elytra. Depression at middle of thorax at base quite smooth with only a few punctures. Terminal segment of maxillary palpi not as large as in other species of the genus. Slightly hairy front but pubescence not erect. No smooth rim bordering the eye posteriorly. Much coarser punctures on scutellum than in *Zilora occidentalis*.

Lateral edge of the abdominal segments not margined beyond the beginning of the second segment, while in the other *Ziloras* the abdominal margin is continuous to the tip of the abdomen.

Length 7 mm.; width 2 mm.

The type is from Cape Rouge, Quebec. Specimens have been examined from Duparquet, Quebec, Can.

FOSSIL INSECTS FROM THE CREEDE FORMATION, COLORADO

PART 1. INTRODUCTION, NEUROPTERA, ISOPTERA AND DIPTERA

BY F. M. CARPENTER, T. E. SNYDER, C. P. ALEXANDER, M. T. JAMES
AND F. M. HULL

INTRODUCTION

BY F. M. CARPENTER

Harvard University

During the past twenty-five years, intensive geologic work in the Rocky Mountain region has revealed several Tertiary lake-bed deposits, the presence of which had not previously been suspected. One of these beds, termed the Creede formation by Emmons and Larson (1923), is extensively exposed on the slopes of Willow Creek, near the town of Creede, Colorado. The formation is highly fossiliferous with plants, and a preliminary account of its flora has been published by Knowlton (1923). In 1932, Mr. Allan Caplan, then a senior in the Creede High School, found that insects also were not uncommon in the formation, and an examination of some of his specimens convinced me that a collecting trip to this formation would be a practicable and profitable undertaking. With the aid of a grant from the Milton Fund of Harvard University, the collecting trip was made during the summer of 1934. In addition to the writer and his wife, the party consisted of Mr. C. T. Parsons, a student in Harvard College, and Mr. Caplan, who joined us at Creede. In the course of the summer about two thousand insects were secured; most of these were actually found by Mr. Caplan, while the rest of the party collected in the Green River shales of Utah.

The present series of papers is based mainly upon the specimens obtained on this trip, but it also covers a collection of

about two hundred other Creede insects, sent to me for determination by Professor Case of the University of Michigan, who had previously secured them from Mr. Caplan. All of the fossils have been sorted into orders and most of them into families or superfamilies. As in the case of the insects of the Latah formation and of the Manitoban amber, I have referred these Creede fossils to specialists on various groups of living insects. Although this procedure tends to delay in large measure the publication of the results, it is the only way capable of yielding authentic determinations and conclusions. Since several more years may elapse before all the specimens of the Creede collection have passed through the hands of specialists, it has seemed advisable to publish the results in several parts, all under the same general title, whenever a sufficient number of manuscripts have been completed. The descriptive part of the present paper deals with the fossils belonging to the following orders and families: Neuroptera (F. M. Carpenter), Isoptera (T. E. Snyder), Diptera, Tipulidae (C. P. Alexander), Bibionidae (M. J. James), and Syrphidae (F. M. Hull). To these specialists and those who are working upon other families I am grateful for their indispensable cooperation.

Since this is the first extensive account of the Creede insects, it is pertinent to include a brief discussion of their geologic occurrence and environment. The geology of Creede district has been thoroughly investigated by Emmons and Larsen (1923). According to them, the Creede formation was deposited in a lake that occupied a valley carved out of the rocks of the Potosi volcanic series. The lower part of the formation consists chiefly of fine-textured, thin-bedded, rhyolite tuffs, usually light grey or light brown. Thicker beds of sandy material, lenses of conglomerate, and numerous bodies of travertine are also present. It is this lower part of the formation that contains the insects and the best plant material. The upper part is of coarser texture and consists of well bedded breccia and conglomerate, with some fine tuff. The origin of the formation seems to have been much like that of the Florissant shales, which lie more than a hundred miles to the north-east. Some of the ash thrown out by local volcanoes fell into the lake and together with sand and mud was deposited at the bottom. Insects

flying over the water were of course caught and entombed by the ash.

Knowlton's study of the Creede plants led him to conclude that the Creede formation was about the same age as the Florissant deposit, i.e., upper Miocene. At the same time, however, he noticed an obvious difference in the composition of the two floras, the most abundant element in the Creede flora being Coniferae, which, although very rare at Florissant, comprised about a third of the species and nearly a half of the individual specimens. The general content of the Creede flora strongly indicates that the lake-bed was deposited at a considerable higher elevation than the Florissant shales.¹ As Cockerell has stated of the Creede flora, very few, if any, high altitude insect faunas have been preserved. The chief importance of the Creede specimens, therefore, depends not so much on their geologic age as on the environment in which they existed. It is of course far too soon to say anything definite about the biotic indications of the Creede insects, but even a cursory survey of the collection at hand, made during the sorting of the specimens into families, indicates that the fauna is an exceedingly small one, there being an extraordinary duplication of a few species. This is of course typical of existing faunas at high altitudes.

ORDER NEUROPTERA

FAMILY CHRYSOPIDÆ

BY F. M. CARPENTER

Eleven specimens of this family are contained in the collection from Creede. This is proportionally a much greater number than has been found in the Florissant shales, which have produced only about the same number in a total of approximately 40,000 specimens. Two species are represented in the Creede series, one apparently being identical with a Florissant species, and the other, already described, being peculiar to the Creede formation. The phylogenetic significance of the Tertiary Chrysopidae has already been discussed in an earlier paper (1935).

¹At the present time, however, both lake deposits have an elevation of about 8200 ft.

Palaeochrysa creedei Carp.

Palaeochrysa creedei Carpenter, 1935, Journ. Paleont., 9: 265, fig. 3.

This species, although similar to the following, is characterized by the extraordinary length of the basal Banksian cell of the fore and hind wings.² The holotype is No. 4316 ab, Museum of Comparative Zoology.

Palaeochrysa stricta Scudd. (Fig. 1)

Palaeochrysa stricta Scudder, 1850, U. S. Geol. Survey Terr. Rept., 13: 166; pl. 14, fig. 13, 14.

There are ten Chrysopids (4462-4471) in the Creede collection which seem to be identical in every way with this

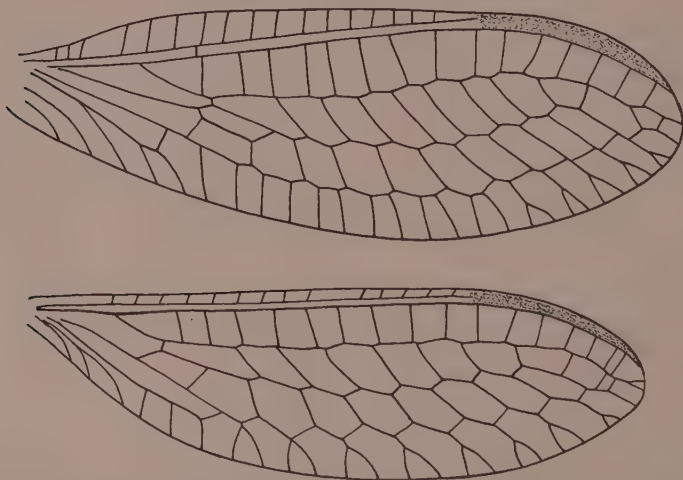


Fig. 1. *Palaeochrysa stricta* Scudd. A. Fore wing (No. 4462, M. C. Z.), length, 12 mm. B. Hind wing (No. 4464, M. C. Z.), length, 9.8 mm. Miocene of Creede, Colorado.

species, previously known solely from the Florissant shales. Since this is the only Creede species of those so far determined which appears to be common to the two beds, I have included drawings of its venation. It should, however, be borne in mind that among the Recent Chrysopidae the venation of closely related species usually shows no differences.

²In my account of the fossil Chrysopidae (Journ. Paleont., 9: 259-271, 1935) the captions for figures 2 and 7 should be interchanged.

FAMILY RAPHIDIIDAE

Raphidia creedei Carp.

Raphidia creedei Carpenter, 1936, Proc. Amer. Acad. Arts Sci., 71: 150, fig. 12.

This species differs from those of Florissant by the more slender wings and narrower costal area. The holotype, No. 3639 ab in the Museum of Comparative Zoology, is the best preserved fossil snake-fly which has been found, apart from those in amber. The members of the Raphidiodea are exceedingly rare in the Florissant shales, and the presence of even one in the relatively small Creede collection at hand is another indication of the biotic differences represented. Like the Florissant Raphidiodea, this Creede species belongs to a genus now restricted to the Old World.³

ORDER ISOPTERA

FAMILY RHINOTERMITIDÆ

BY THOS. E. SNYDER

Senior Entomologist, Division of Forest Insects, Bureau of Entomology and Plant Quarantine, United States Department of Agriculture

The single fossil wing sent to me for identification proves to represent a species of *Reticulitermes* new to science. Five fossil species of this genus are already known—four from Baltic amber and one from the Miocene shale of Florissant, Colorado. *Reticulitermes* is confined to the temperate regions of the world. A living species (*R. tibialis* Banks) occurs in localities in Colorado, but nowhere in the state at an elevation of over 7,000 feet. The wing of *tibialis* is larger than in this fossil.

Reticulitermes creedei Snyder, n. sp. (Plate 13, fig. 3)

Wing (hind wing (?)): Costal area indistinct. Median vein *not* free from stump or wing scale; closer to subcosta than to cubitus; branches to tip of wing. Cubitus running

³An account of the geographic distribution of the fossil and Recent Raphidiodea is contained in my revision of the Nearctic species (Proc. Amer. Acad. Arts Sci., 70: 89-157, 1936).

in about the middle of wing area, with numerous branches, to posterior margin of wing.

Length of wing—6.5 mm.

Width of wing —1.7 mm.

Wing smaller than in *Reticulitermes fossarum* Scudder from Florissant, Colorado, in Miocene shale.

Holotype: Museum of Comparative Zoology, No. 4472 ab; collected in the Miocene shales at Creede, Colorado.

ORDER DIPTERA

FAMILY TIPULIDAE

BY CHARLES P. ALEXANDER

Massachusetts State College

I am greatly indebted to Dr. F. M. Carpenter for the privilege of studying the series of Tipulidae collected by him at the fossil beds located near Creede, Colorado. As indicated elsewhere by Dr. Carpenter, the Creede formation is of approximately the same age as the Florissant shales (Miocene), about a hundred miles to the northeast, near Pikes Peak, Colorado.

All of the specimens pertain to the single genus *Tipula* Linnaeus and virtually all seem to belong to a single species that I am herewith describing as new under the name *Tipula carpenteri*. In almost all of these individuals, the wings are the only parts that are well preserved. Throughout the vast complex of forms now included within the limits of the genus *Tipula* (approximately 1000 species, Recent and fossil), the wing venation is singularly uniform and offers but slight aid in the subdivision of the genus into smaller groups. In the recent fauna, the definition of species in this genus is based in great part upon the structure of the male hypogygium, characters that are quite unavailable in the present fossil series. A careful analysis of wing-pattern and venation has been made since any determination of the present series must depend chiefly or solely upon such characters.

More than a score of fossil *Tipula* and closely allied groups have been described from the early Tertiary of western

North America by Scudder and Cockerell, the majority from the Florissant shales. Scudder (1894) proposed four supposedly new generic groups centering about *Tipula* that must be analyzed and evaluated in relation to the great increase in our knowledge of the Tipulidae in the past thirty years.

Manapsis Scudder (l.c., pp. 222, 223) with cell *M1* lacking or imperfectly developed. Affinities with other Tipulinae uncertain, due to the difference in venation in the two wings of the type. Several Recent Tipuline groups are now known in which cell *M1* is lacking (as *Idiotipula* Alexander, *Xenotipula* Alexander, and others).

Rhadinobrochus Scudder (l.c., pp. 223, 224) based on the character of an unusually narrow cell *1st M2*, which, in one wing of the unique type, shows an extra vein issuing therefrom, lying between veins *M1+2* and *M3* of the normal Tipuline venation. The value of this character is questionable, especially in the present instance where the venation appears to be abnormal (see Alexander, 1919).

Tipulidea Scudder (l.c., pp. 238, 239) was separated from *Tipula* s.s. only on the basis of small physical size (wing, 9.5-13.5 mm.) and the relative shortness of *Rs* which is approximately equal to *m-cu*. Both of these characters are duplicated in the recent subgenus *Schummelia* Edwards of the genus *Tipula*. The status of *Tipulidea* must remain in question until more evidence becomes available but it seems possible that the group may be maintained as a valid subgenus of *Tipula*.

Micrapsis Scudder (l.c., pp. 242-243) is based on a single imperfect specimen. The characters upon which the group is founded are very weak, consisting of the shortness of *Rs* and of an unusually small *1st M2*, with vein *M4* forking at base of this cell, with *m-cu* placed some distance beyond the origin of *M4*. The latter combination of characters is much as in *Nephrotoma* and some *Tipula* and the status of the group is very much in question.

In my opinion, none of the four Tipuline groups discussed above is well founded and all should wait upon the discovery of further material to substantiate or disprove their claims. It appears to me that all except *Tipulidea* may well be found to be based on teratological specimens, while all are based

on uniques in an indifferent state of preservation. The figures supplied by Blake do not always conform to the descriptions of Scudder (as in *Manapsis*, where in the left wing vein $R1+2$ is shown as being distinctly preserved, whereas on the right wing it is not indicated and is either atrophied or poorly evident. In *Rhadinobrochus*, the venation of the two wings of the unique type is so dissimilar that the veins of the two sides cannot be homologized).

***Tipula carpenteri* Alexander, n. sp. (Plate 13, figs. 1, 2)**

Male.—Length about 16-17 mm.; wing 17-18 mm.

Female.—Length about 21-22 mm.; wing 20-24 mm.

General coloration dark. Praescutal pattern apparently consisting of three entire dark stripes on a somewhat paler ground. Abdomen dark, the tergites with a still darker median longitudinal stripe that is narrowly interrupted at posterior border of each segment; lateral tergal stripes narrower and less distinct; sternites with a similar but much narrower median vitta.

Antennae of male longer than in female, subequal to the combined head and thorax; flagellar segments bicolorous, the basal enlargement darker than the apex; verticils short. In female, antennae about twice the length of head. In both sexes, flagellar segments with poorly developed basal enlargements to appear subcylindrical.

Wings subhyaline, with a conspicuous brown and white pattern; brown areas include a medium-sized marking at origin of *Rs*; stigma and a confluent seam on anterior cord; *m-cu* and adjoining portions of vein *Cu*; a dark cloud in cells *M* and *Cu* at near midlength of vein *Cu*, with another similar dark area near outer end of *Cu*, chiefly in cell *M*, the two dark markings separated by a whitish or ground area at near two thirds the length of cell *M*; distal portions of cells *R2* and *R3* slightly darkened but outer half of cell *R5* somewhat paler; the white areas appear chiefly as a broad post-stigmal fascia involving cell *Sc2*, basal third of cell *R2*, subbasal third of cell *R3* and the subproximal end of cell *R5*; additional oblitative areas involving base of cell *1st M2* and the adjoining basal portions of cells *M3* and *M4*. Wings relatively broad, the length about 3.6 times the

greatest width. Venation: *Rs* relatively long, about one half longer than *m-cu*, or subequal to the width of cells *R* and *M* opposite its origin; vein *R1+2* preserved; petiole of cell *M1* variable in length, from one third as long to subequal to *m*; *m-cu* at fork of *M3+4*; cell 2nd *A* of moderate width.

Hypopygium moderately enlarged, the outer end truncated. Ovipositor with relatively stout valves.

Holotype: No. 4536, Museum of Comparative Zoology, collected by Allan Caplan; this consists of a nearly complete insect.

Paratypes (both sexes): twenty-three in the Museum of Comparative Zoology (Nos. 4473-4495), and one in the University of Michigan Museum (No. 15383). The specimens figured are the holotype and paratype no. 4489.

I take unusual pleasure in naming this interesting Miocene *Tipula* in honor of Dr. F. M. Carpenter. As shown by the figures, there is a somewhat marked variation in the wing-pattern and venation in different individuals. The possibility exists that more than a single species is included in the present series but this does not seem to be the case. In some specimens the radial cells beyond the post-stigmatic white fascia are more uniformly darkened than in others, as shown by the figures, which represent extremes within the series. In No. 4489, figured, cell *M4* is more strongly narrowed at wing-margin than in the holotype, while vein *R3* is slightly less extended. This individual, while represented chiefly by the wings, is evidently a female and is the largest specimen whose measurements are given above.

The species that is most similar to the present fly would appear to be *Tipula limi* Scudder, which is somewhat smaller, with narrower wings. Scudder describes the species as having a darkened cloud at origin of *Rs* but in neither of his figures (l.c., Pl. 8, fig. 4, ♀; Pl. 9, fig. 1, ♂) is this distinctly shown. This Florissant species has distinct lateral stripes on the abdominal tergites in addition to the subequal median vitta.

The various allied Miocene species having patterned wings may be separated by the accompanying key:

1. Wings with vein *Sc* relatively short, *Sc2* ending at near midlength of cell *R1* and about opposite two thirds the length of *Rs*. 2

- Wings with *Sc* longer, *Sc2* ending beyond midlength of cell *R1* and nearly opposite three fourths the length of *Rs*. *carpenteri* sp. n.
2. A conspicuous darkened cloud at origin of *Rs*. 3
No darkened cloud at origin of *Rs*. 4
 3. *Rs* unusually long, approximately twice *m-cu*; wings broad, about 3.5 times as long as wide. *tartari* Scudder
Rs of moderate length, approximately one and one half times as long as *m-cu*; wings narrower, approximately four times as long as wide. *limi* Scudder
 4. A conspicuous dark cloud at near midlength of vein *Cu*, extending caudad into cell *Cu*; abdominal pattern of individual tergites transverse; size large (wing, female, 23 mm.). *maclurei* Scudder
No dark cloud at midlength of vein *Cu*; abdominal pattern of the individual tergites longitudinal; size medium (wing, female, to 17.5 mm.). *carolinæ* Scudder

Tipula spp.

In addition to the material previously discussed, the Creede collections included seven specimens that appear to represent one or more additional species. These belong to the group with wings immaculate or virtually so and no attempt can be made to make a more detailed identification. The specimens included bear the numbers 4496.

FAMILY BIBIONIDAE

BY MAURICE T. JAMES

Colorado State College

Plecia creedensis James, n. sp. (Fig. 2)

This species differs from the Florissant species and from those described by Handlirsch from the Canadian Tertiary in that vein *R2+3* arises from the radial sector a considerable distance before the apex of *R1*, is strongly and distinctly elbowed at its origin, and runs almost parallel to *R1* for a considerable distance.

♀. A yellowish species, the thorax, head, palpi, and base of the proboscis brown; the abdomen is very light yellow along the narrow posterior margins and on the venter; the antennae are slightly darkened basally. Pile concolorous

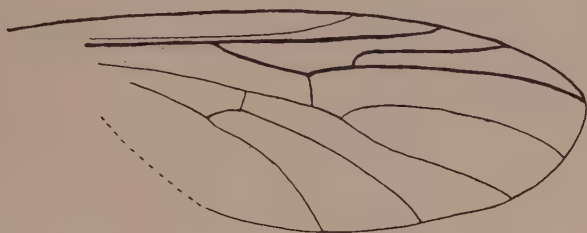


Fig. 2. *Plecia creedensis* James, n. sp., drawing of wing of holotype, No. 4523, M. C. Z.

with the background. Halteres evenly light yellow. Each tibia with a short, black preapical bristle. Wings slightly yellow-fumose, the veins yellow; those of the posterior part of the wing evident, though definitely lighter than the heavy anterior veins.

Length, 12 mm.; of abdomen, 8 mm.; of wing, 9 mm. The following measurements are in millimeters. Anterior femur, 2, tibia, 2.3, tarsus, 2.6; middle femur, 1.8, tibia, 1.8, tarsus, 1.9; posterior femur, 2.7, tibia, 2.8, tarsus, 2.4; length of head, .8, of antennae, .8, of thorax, 2.7; length of vein *Rs* to cross-vein *r-m*, 1.5, of *Rs* from *r-m* to origin of *R2+3*, .7, of cross-vein *r-m*, .4, of *M* from *r-m* to the furcation, .4; distance of apex of *R1* from base of wing, 6.4, of origin of *R2+3* from base of wing, 5.1.

Holotype (female): No. 4523, Museum of Comparative Zoology. This specimen is well preserved and is in lateral position, so that practically all characters of taxonomic importance are visible.

Paratypes: twelve females; eleven (Nos. 4524-4532) in the Museum of Comparative Zoology, and one in the Museum of the University of Colorado. Eight other specimens are present in the collection at the Museum of Comparative Zoology, but they are not designated as paratypes because of poor preservation.

FAMILY SYRPHIDAE

BY F. M. HULL

University of Mississippi

One species of Syrphidae is contained in the collection of fossil insects from Creede. This belongs to the Recent genus *Platycheirus*. The only other reference to fossil forms of this genus is that of Pongracz (1928, p. 190), who places here two species from Oeningen, originally included by Heer in *Syrphus*. I examined Pongracz's specimens in the British Museum and found them to be poorly preserved.

***Platycheirus persistens* n. sp. (Fig. 3)**

Male. Length 10.0 mm.; of abdomen and scutellum 6.0 mm.; of wing 7.2 mm.; second specimen, length 10.0 mm.; thorax and abdomen 6.2 mm.; of wing 8.8 mm.

Head: hemispherical, obviously narrower than thorax. Eyes narrowly dichoptic. Face dark in color. No details of antennae visible. *Thorax*: dark, though very little pigment is preserved, and no details of pile can be seen. Scutellum semicircular, the margin evenly convex, the width about one and three fourths greater than the length. *Abdomen*: slender, the sides not quite parallel, but slightly convex, leaving the middle segments barely wider. The first segment juts beyond the rim of the scutellum by a fifth the latter's length. Second and third segments of nearly equal length, the former the longer. Fourth segment slightly shorter than third. Fifth segment two fifths as long as the preceding one. Hypopygium prominent and smoothly rounded. The segments are marked with brown. The posterior two-fifths of the second segment with a median wedge, pointing to and reaching the anterior border, and similar pattern on the two succeeding segments, the brown of the posterior border on the fourth segment occupying nearly the whole of the posterior half. The fifth segment is clear. *Legs*: slender. For the most part, they are not well preserved, but one set of tarsi, apparently the left hind tarsi, is well preserved and shows decided expansion and thickening of the joints. *Wings*: poorly preserved.

Female. Specimen Nos. 3950 and 3951 is without head, obverse and reverse. These wings are a little better preserved and show the third longitudinal vein and costa ending quite beyond the tip of wing, though not nearly as much as in *Rhingia*. The abdominal pattern is quite similar; beyond the fact that the segments are slightly wider, I am unable to detect differences of importance. One whole hind leg

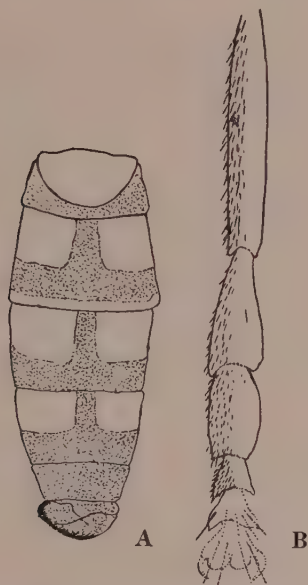


Fig. 3. *Platycheirus persistens* Hull, n. sp. A, abdomen; B, tibia and tarsus of holotype, No. 3949, M. C. Z.

(right) is preserved. The femora were slightly thickened one and two-fifths the width of tibiae and the tarsi were not dilated. The obverse is fragmentary and poor. Perhaps a trace of antennae appears upon it. The opposite hind tarsus is shown, the maculation is deceptive and the abdomen also appears disproportionately short and wide.

Holotype: 1 male, No. 3949; in the Museum of Comparative Zoology.

Paratype: 1 female, No. 3950; in the Museum of Comparative Zoology.

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EXPLANATION OF PLATE 13

Fig. 1. *Tipula carpenteri* Alexander, n. sp. Photograph of holotype, No. 4536, Museum of Comparative Zoology. Length of wing, 18 mm.

Fig. 2. *Tipula carpenteri* Alexander, n. sp. Photograph of paratype, No. 4489, Museum of Comparative Zoology. Length of wing, 17 mm.

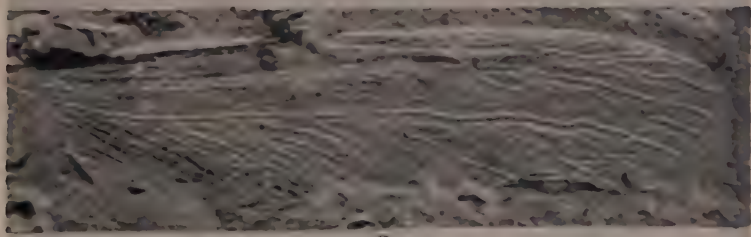
Fig. 3. *Reticulitermes creedei* Snyder, n. sp. Photograph of holotype, No. 4472, Museum of Comparative Zoology. Length of wing, 6.5 mm.



1



2



3

Fossil Insects from Creede

THOMAS SAY'S FREE-LIVING MITES
REDISCOVERED¹

By ARTHUR PAUL JACOT

U. S. Forest Service, New Haven, Conn.

Thomas Say, the earliest American to record mites from the United States, described a possible six species of free living mites from eastern Georgia and Florida. They were obtained from the late fall to the early spring. Say mentions as places visited by him (9) Fernandina (on Amelia Island), St. Mary's, Darien, Cumberland Island, and Savannah which he reached (homeward bound) on April 11th 1818.

Although I was able to collect at these localities during April, I found the soil and litter so dry that there were very few mites about. I was informed by the Weather Bureau that it had not rained for two months, a very unusual condition. The Islands east of Savannah were much burned over and I obtained no mites from them. The only type of collecting done was to look under the bark of trees and under stones—these being the only niches mentioned by Say. I found no stones, but a few tiles at one place. They yielded nothing.

Say described two species of Trombidium. I found three species of mites resembling Trombidiids, securing nineteen specimens of a Smaris, fourteen specimens of a Trombicula, and four specimens of a Microtrombidium. All these were taken from under the bark of prone trunks. A careful study of Say's *T. sericeum* reveals a body shape typical of Smaris. The only character that does not fit Smaris is the short, silken hair.

Now turning to Say's *T. scabrum*. If one divides a Trom-

¹Aided by a grant of the Elizabeth Thompson Science Fund.

bicula at the constriction, calling the portion behind the constriction the abdomen and the part anterior to it the thorax, then Say's description: "ovate body, broadest and very obtusely rounded before, with thorax *obtriangular*," accords with that genus, at least far more so than with any other Trombidioid. Moreover the surface of this Trombicula is "unequal, with numerous indentations." The discrepancies are, "minutely scabrous." "With hardly perceptible hairs" may be true enough but these two statements seem contradictory. The description of the hairs of *T. sericeum* fits *T. scabrum* and vice versa! Eyes white is difficult to explain unless Say took for eyes what I take to be eyes in this otherwise eyeless genus. If he saw these eyes he must have seen the hairs correctly in both species (genera) but must have gotten his two descriptions mixed.

At any rate he secured two Trombidioid looking mites from trees in April. I secured two species from the same localities and niche in April. My most common species is unquestionably the same as his most common (*Smaris*). On the whole his descriptions fit my two commonest Trombidioids. Therefore, until someone can duplicate our collecting and get quite different results, I will have to accept these two species as described below.

Trombiculoides gen. nov.

Resembling Trombiculus but with area sensiligera much more highly developed, triangular, with one of the angles directed posteriad, the others laterad (figures 1 and 2); immediately posteriad of the lateral angles are rounded bosses which appear to be eyes. This area sensiligera is situated in a hollow or recess formed by the highly developed lateral lobes of the thorax, which extend far anteriad and tower above the sensiligerous area. The anterior edge of the abdomen (s.s.) also encroaches on the area and also towers high above it, thus very much secluding this sensitized area.

Type: *Trombiculoides scaber* comb. nov.

The presence of eyes (for the structures in question have every appearance of eyes) in this area and in this group, makes this species quite distinct from all other Trombidiids.

Trombiculoides scaber (Say) 1821, p. 69

(Figures 1 and 2)

Diagnostic characters: Superficially resembling a *Trombicula*, but with the characters of this genus. Pseudostigmatic organs long, fine, simple; palps with simple bristles on dorsal face, and unilaterally ciliate bristles on sides, especially the lateral sides, the three spines of palptibia closely approximated (figure 2); palptarsus nearly three times as long as broad.

Description: Size fairly large, ovigerous females 1.36 mm. long; tarsi I oval, 0.246 mm. long and 0.09 mm. high; color rose red; abdomen broadly oval, constriction strong, lateral lobes of "thorax" large, bulby (figure 1); prothorax low, extending considerably beyond lobes of metathorax, anterior edge notched (figure 1), covered with bristles (only the anterior three of one side are figured); all bristles of abdomen and thorax typical of *Trombicula*, with about sixteen cilia along the bristle but irregularly disposed, so that the bristle is ciliate all about; base of sensiligerous area with a few bristles (insertions only indicated in figure 2), anterior edge with a median crest or ridge, another such ridge at lateral angles; pseudostigmata widely separated, close to lateral angles, sides of area ribbed; the "eyes" much larger than pseudostigmata; legs rather short (figure 1); legs I as long as body; tarsi I not much larger than tibiae I, but longer, with small hooks; tarsi II to IV with distal end tapering conspicuously.

Material obtained: Nine specimens from under the bark of a large prone oak; outskirts south of Savannah, slides 36S3, 36S5. Five specimens from under bark of prone pine trees, outskirts north of Darien; slide 36S6-1.

In the same niche with these mites were many mollusks, some pseudoscorpions, and the blue-tailed skink [*Eumeces fasciatus* (L.)]. Would this lizard be the host of the larvae of this *Trombiculoid*?

Smaris sericea (Say) 1821, p. 70

(Figures 3 to 6)

Diagnostic characters: Body elongate, ovate, with rather

short "rostrum" (figure 3); eyes one on each side, colorless; pseudostigmatic organs present at both ends of crista, setaceous; bristles of dorsum short blunt, forming a boat-shaped crest backed by an oval shield; thumb of palptibia with five bristles (figure 5).

Description: Size of ovigerous females: length 1.36 mm., breadth 0.68 mm.; color of body vermillion, legs paler; shape of body (figure 3) ovate, rather elongate, rounded behind, anterior end broad, with rounded "shoulders," cephaloprothorax much narrower, capable of considerable lateral retraction so that in most alcoholic specimens the posterior half is much broader than anterior half (figure 3), in nature the upper part of the cephaloprothorax is slender so that the lower half flares out on each side (figure 4); crista metopica extends as a slender almost undifferentiated area from broadest area of abdomen nearly to tip of "rostrum" where it divides to straddle this region (figure 4); both pairs of pseudostigmatic organs setaceous, gradually tapering but lined with four rows of short, crowded, black cilia; anterior pair one-and-a-half times length of body bristles, posterior pair two to three times length of body bristles; eyes on transverse plane passing through center or slightly posteriad of center of crista, colorless, diameter equal to length of body bristles.

Bristles of dorsum of body formed of an ovate, membranous plate or shield strengthened by fine radiating ribs the ends of which barely project beyond edge of shield. From the longitudinal center of this shield there springs the keel of a canoe-shaped crest, the edges or gunwales of which are studded by the protruding ribs of the boat (figures 6). Bristles of venter more slender, crest more slender, both crest and shield barbs lengthened into long spines which are fewer in number. These spines give the bristle the appearance of a bearded wheat head.

Legs I a little longer than body (figure 3), other legs shorter; legs I with distal trochanters as long as femora; legs II to IV with distal trochanters shorter than femora and somewhat fused to femora to form a semianchylosed, nonfunctional joint. Leg bristles as body bristles but more elongate, crest more slender, parallel sided, points of barbs much produced as minute spines. Tarsal bristles with five

longitudinal rows of such spinules springing from outer face of bristles, giving them the appearance of well combed hedge-hogs.

Bristles of palps simple to slightly burred at base, fairly long (figure 5).

Material obtained: One specimen from under bark of a large prone oak, outskirts south of Savannah; slide 36S3. One specimen from under bark of felled pine trees, outskirts north of Darien, slide 36S8-1. These mites and *Trombiculoides scaber* occurred to the extent of one in about every twenty linear feet. Thirteen specimens from under bark of old log, St. Simon Island; slides 36S8-2 and 36S8-3. Four specimens from under bark of old log, Amelia Island, between Fernandina and the sea beach; slide 36S10.

The nearest European species is *S. ampulligera* (2, fasc. 39:10) but the bristles are entirely different. I am, at present, unaware of synonyms.

I have this species from the woodlands of western North Carolina. *Smaris longilinealis* (3, p. 61, pl. 9, fig. 14; 4, p. 88, pl. 4, figs. 22, 23) from Marion and Urbana, Illinois, judging from the armature of the palps, seems to be this species. I have not seen the types. In the original description Ewing reports a single pair of eyes; in his later description he records a double pair. The size given in this second description corresponds to the Georgia specimens.

Smaris sp. (Figure 7)

Similar to the European species in that there are foliose bristles on palps. Bristles of abdomen broad cuneiform, distal end truncate to emarginate, the crest barely standing out from the shield, usually bearing three longitudinal rows of barbs (figure 7, right upper) or two divaricating rows (figure 7, left upper). Figure 7, right lower, is distofrontal aspect, while the left lower are distal aspects.

From under bark at base of hickory trees, Coscob headland, Conn.

Erythraeus mamillatus Say 1821, p. 70

The description calls to mind *Labidostoma*; the marginal impressed line being the juncture of notogaster and ventral

plate which might give this effect. The description fits no *Erythraeus*.

I found no *Labidostoma*.

***Gamasus spinipes* Say 1821, p. 71**

This may be a *Holostaspis* (s.l.) or a *Cyrtolaelaps* (s.l.). I know of no free living species which fits the description which is rather detailed as to leg characters. As all of Say's other Parasitids were parasitic, this one also may have been. He gives neither locality, habitat nor host.

***Oribata glabrata* Say 1821, p. 73**

I have already referred to this species (5, p. 260). None were found. It is the commonest *Oribotritia* of the south.

***Bdella oblonga* Say 1821, p. 74**

(Figure 8)

Say describes the distal segment of the palp (the palptarsus) as "attenuated towards the base and truncated at tip." This places the species in *Bdella* sensu strictu. The size, "rather more than one-twentieth of an inch" that is one-sixteenth, makes it the common species of *Bdella* of that region. This species differs from the European *Bdella longicornis* in that: of the two lateral bristles of palptarsus (figure 8), the distal is much shorter and finer than the proximal (the reverse is true in specimens from northern Europe); the pseudostigmatic organs are quite persistent while they seem quite deciduous in the European species.

Bdella decipiens (7 and 8) seems to be closely related, but palptarsus has only six bristles.

Bdella oblonga seems to be common throughout the eastern United States. I find no geographical races. *Bdella cardinalis* (1, p. 219) is therefore a synonym. *Bdella lata* (4, p. 69, pl. 2, fig. 9) is also a synonym and Ewing's figure 9 a very good toto figure of *Bdella oblonga* except that one bristle of palptarsus has been omitted. The toto figure of *Bdella cardinalis* (4, pl. 1, fig. 6) is inaccurate and should be discarded. Figure 5 is good as far as it goes, but figure 7 lacks two bristles on palptarsus and has two extra bristles on the genual.

Florida specimens of *Bdella oblonga* are without dark pigment, but dark material sometimes occurring inside the body gives the abdomen a mottled appearance. One specimen from Florida (lot 90) has "black" pigmented eyes. One specimen from among several from Mt. Logan, Chillicothe, Ohio (slide 32M108a1) and one from Bent Creek, Buncombe Co., N. Car., each have the two lateral bristles of palptarsus subequal. In identifying this species one must bear in mind that the bristles of palptarsus have a varied appearance depending on orientation of the segment. In what I would call the optimum orientation four of the bristles are on one face of the segment (though near the edge) while a fifth (seventh) is on the opposite face (figure 8).

Material examined: Four specimens from well decayed fallen trunks, and moss thereon, top of slope, Calhoun Pines, Cornwall, Conn.; taken August 26th 1932, slides 3255a1 and -a2. Three specimens from leaf mould, Shawnee State Forest, Otway, Ohio; taken September 23rd 1926 by August E. Miller, slide 34M22a2. One specimen from ant's nest under bark of dead stumps, Eselgroth's woods, (four miles east of) Chillicothe, Ohio; taken April 26th 1925 by Miller, slide 32M57a2. Of eighty-six square-foot blue-grass sod samples taken weekly by A. E. Miller at Mt. Logan, Chillicothe, the following were obtained: one specimen May 5th 1924, slide 32M94a; two on August 10th 1924, slide 32M108a1; one on October 6th 1924, slide 32M81a2; three on March 9th 1925, slide 32M139a; two on March 16, slide 32M140a; one on March 30th, 32M137a2; one on April 13, 32M63a; one on April 20, 32M9a; one on April 27, 32M7a; one on May 4, 32M21a1; one in October 19, 32M35a; one on December 7, 32M58a (thus, in grassland, commonest in the early spring). The following were taken by Vera G. Smith: one specimen from ground, forest edge (flood plain), lower striplands, Vermillion Co., Ill.; taken June 29th 1926, slide 2390; from University woods, Urbana: three from leaves, March 29th 1926, slide 1085; one from leaves, August 2nd, lot 5815; one from leaves, August 16th, lot 3548; one from herbs, August 21st, lot 4370. Two specimens from bark chips, Dodson's woods, Urbana; taken August 21st 1926 by Miller, slide 32M1a. One under loose bark of untoped, fallen

white oak, same woods; taken June 6th 1927 by Miller, slide 32M125a1. One under loose bark, Brownfield's woods, Urbana; taken June 9th 1926 by Miller, slide 32M13. Four from exposed logs and stumps in open woods near Muncie, Ill.; taken June 22nd 1927 by Miller, slide 32M147. One from under loose bark of fallen log, open woods meadow, Sidney, Ill.; taken June 21st 1926 by Miller, slide 32M8a. Four from moist, loose bark of fallen log in woods along Salt Fork Creek, south of Oakwood, Ill.; taken May 11th 1926 by Miller, slide 32M124a. One specimen from beneath bark of fallen tree, a few miles south of Savannah, Ga.; taken April 1936, slide 36S5. Two specimens from litter, horticultural grounds Gainesville, Fla.; taken February 13th 1928 by Edgar F. Grossman, lot 13. One (with pigmented eyes) from same place, taken February 29th, lot 30. One from near insectary, horticultural grounds, Gainesville; no date, taken by H. E. Bratley, lot 90. One from hickory litter, Pinkoson Springs; taken March 4th 1928 by Grossman, lot 33. One from long leaf pine litter, south shore of Newman's Lake, Gainesville; taken March 25th 1928 by Grossman, lot 55. Two from *Tamola littoralis* litter, shore bay, north beach, St. Augustine, Fla.; taken March 7th 1928 by Grossman, lot 34. Two from same locality; taken April 1st 1928 by Grossman, lot 63. One from live oak litter, Crescent City, Fla.; taken May 1st 1928 by Grossman, lot 82. One from litter, Bradenton, Fla.; taken May 2nd 1928 by George F. Weber, lot 87. Two from live oak and pine litter, Perry, Fla.; taken February 2nd 1928 by Grossman, lot 10. One from pine litter, between Perry and Mayo, Fla.; taken April 28th 1928 by Grossman, lot 78. Nine from deciduous litter, Villa Tasso, Choctawhatchee Bay, Fla.; taken May 18th 1928 by R. W. Blacklock, lot 101.

The following species are undescribed:

***Bdella trisetosa* sp. nov.**

(Figure 9)

Small, total length of largest specimen 0.82 mm.; with dark pigment generally distributed but abdomen paler; rostrum with only two pairs of bristles (in addition to the distal); mandibles with attenuate chelae; lateral bristles

(of cephaloprothorax) subequal to interpseudostigmatic, nearly as long as dorsal bristles of abdomen; eyes with pigmented ground; posterior eyes at widest part of cephaloprothorax, anterior eyes twice their diameter from posterior eyes; pseudostigmata on transverse plane slightly anterior to posterior eyes; the usual nine bristles of dorsum of abdomen fairly long but the three anterior mesal pairs not as long as their interspaces; lateral face of palptarsus with three subequally long bristles (figure 9), the posterior of the three is most ventrally inserted; distal end of palptarsus tapering markedly, hyaline collar of lateral bristle quite long and prominent (figure 9).

Cotypes: Two specimens from leaf litter about base of trees in an abandoned orange grove, five miles beyond Micanope, Fla.; taken February 26th 1928 by Edgar F. Grossman, slide G28Bd1 and -Bd2.

***Spinibdella wilsoni* sp. nov.**

(Figures 10 and 11)

Fairly large, total length of gravid female 1.3 mm.; with dark pigment restricted to prothorax and cephalon in immatures, slightly more extensive in adults; rostrum with two pairs of bristles (in addition to the distal); mandibles with attenuate chelae, the only bristle inserted near base of chelae (figure 11); lateral bristles of cephaloprothorax much shorter than interpseudostigmatic which are about half length of dorsal bristles of abdomen; eyes with pigment, distant their own diameter; anterior bristles of dorsum of abdomen nearly as long as interspaces; dorsal face of palptarsus with one long (longer than the segment) straight bristle; lateral edge with two bristles (figure 10): the distal one subequal to length of segment, the proximal one much shorter, mesal face with two bristles, both rather short, distal end with both major bristle cups highly developed (figure 10).

Material examined: One specimen from leaf litter, sunny, rather dry, live oak and pine, Perry, Fla.; taken February 2nd 1928 by E. F. Grossman, slide G10Bd1. One specimen from leaf litter, high, dry, under hickory tree, Pinkoson Springs, Gainesville, Fla.; taken March 4th 1928

by Grossman, slide G33Bd1. Six specimens from leaf litter of *Tamola littoralis*, shore bay, seven miles from south point of North Beach, St. Augustine, Fla.; taken March 7th 1928 by Grossman, slides G34Bd1 to -Bd4 (*cotypes*). One specimen from leaf litter and grass, old laboratory, Bradenton, Fla.; taken March 14th 1928 by George F. Weber, slide G44Bd1 (more pigmented). One specimen from Cortez, Fla.; taken March 15th 1928 by Weber, slide G45Bd1.

Material collected under the Elizabeth Thompson Science Fund is to be deposited at the Museum of Comparative Zoölogy. Material from the Grossman collection is being returned to Dr. J. W. Wilson of the Agricultural Experiment Station of Florida.

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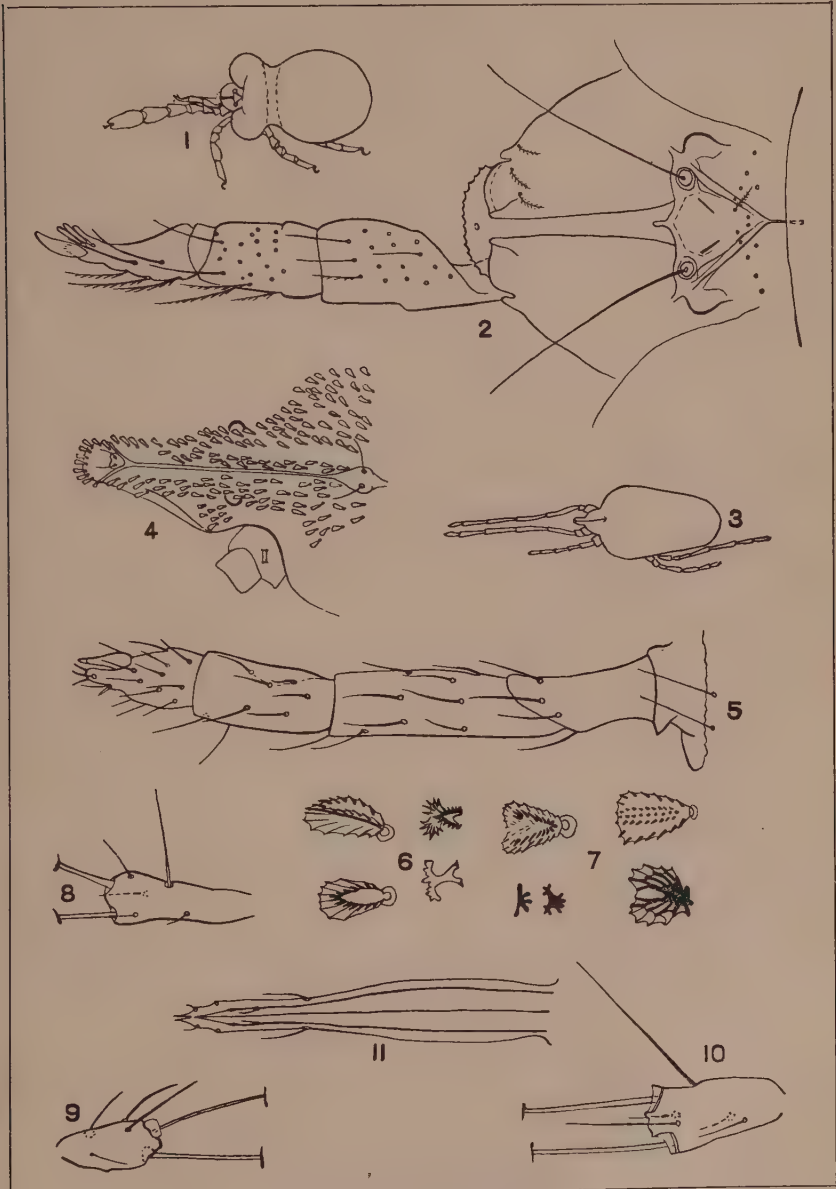
DESCRIPTION OF PLATE XIV

Trombiculoides scaber (Say)

- Fig. 1. Dorsal aspect, appendages of one side and bristles omitted; ratio x24.
- Fig. 2. Dorsal aspect of cephaloprothorax and a palp, most of the bristles omitted; ratio x200.

Smaris sericea (Say)

- Fig. 3. Dorsal aspect, three legs and bristles omitted; ratio x24.



Jacot — Free-living Mites

- Fig. 4. Dorsal aspect of cephaloprothorax; ratio x75.
Fig. 5. Ventral aspect of a palp, extruded; ratio x330.
Fig. 6. Various aspects of bristles of dorsum of abdomen; ratio x440. The bristle to the left of the numeral and below it is as seen full face, that above is as seen somewhat from the side, the others are end views.

Smaris sp.

- Fig. 7. Various aspects of bristles of dorsum of abdomen; ratio x440. Figures to the left of the numeral and below are end views, the others are full face, except the lower right which is somewhat from the end.

Bdella oblonga Say

- Fig. 8. Palptarsus; ratio x200.

Bdella trisetosa sp. nov.

- Fig. 9. Left palptarsus, dorsal aspect (lower edge of figure is mesal face); ratio x440.

Spinibdella wilsoni sp. nov.

- Fig. 10. Mandibles lying over rostrum; ratio x200.
Fig. 11. Palptarsus, lateral aspect (lower edge of figure is ventral edge); ratio x330.

A REVIEW OF THE AMERICAN BEES OF THE GENUS
MACROPIS (HYMEN., APOIDEA)

By CHARLES D. MICHENER

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Since the genus *Macropis* has not previously been recorded in America west of eastern Colorado, it is of interest to find *M. morcei*, the most widely distributed of our species, in Montana, and a new form of *M. steironematis* in Washington State, an extension of the known range of the genus by well over one thousand miles.

A comparison of our species with the descriptions and figures of Old World forms shows that the North American species belong to *Macropis* s.str., not to the subgenus *Paramacropis*¹. Indeed the genitalia and sternites of our species agree in all essential points with the figures of *M. labiata* given by Saunders². There are, however, certain differences, both in the genitalia and in the sternites. In *M. morcei* and *ciliata* the lateral projections of the eighth sternite, slender in *labiata*, are mere angles, while in *M. steironematis opaca*, described below, they are broad, rather truncated anteriorly, and about as long as in *labiata*. In *M. morcei* the genitalia are very similar to those of *M. ciliata* but differ in the somewhat shorter outer ramus of the stylus. I have not been able to study the genitalia of *M. patellata* or typical *M. steironematis*.

If *M. longilinguis* Provancher³, described from the female, proves to be true *Macropis*, it is probably a synonym of *ciliata* or *patellata*. *Scapter andrenoides* Smith⁴, which was referred to *Macropis* by Dalle Torre is placed in *Pseudopanurgus* by Cockerell⁵.

¹Popov and Guiglia, 1936, Ann. Mus. Civ. Storia Nat. Genova, 59:287.

Popov, 1936, Proc. Royal Ent. Soc. London (B) 5:78.

²Saunders, 1882, Trans. Ent. Soc. London, pl. 10.

³Provancher, 1888, Add. Faun. Ent. Can. Hym., p. 424.

⁴Smith, 1853, Cat. Hym. Brit. Mus., 1:121.

⁵Cockerell, 1904, Can. Ent., 36:303.

Macropis steironematis opaca Michener n. subsp.

Male: Similar to *M. steironematis* but hind metatarsus dull, very minutely roughened on outer side; punctures of hind tibiæ smaller than in *M. steironematis*, the surface between them minutely roughened; punctures of vertex more numerous, leaving only very small impunctate regions; surface between punctures of vertex slightly roughened. Length 9 mm.

Holotype: Morgan's Ferry, Yakima River, Washington, July 1, 1882, in the collection of the Museum of Comparative Zoölogy at Cambridge, Massachusetts.

Differs from the typical form of this species by the much duller surface of the legs and vertex.

Macropis morcei Robertson

Two specimens from Montana (no further data) are from the collection of the Academy of Natural Sciences of Philadelphia.

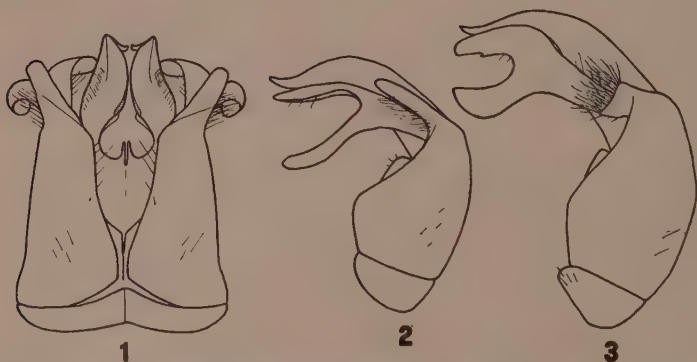


Fig. 1. 1, Dorsal view of genitalia of *Macropis ciliata* Patton; 2, Lateral view of genitalia of *Macropis ciliata* Patton; 3, Lateral view of genitalia of *Macropis steironematis opaca* Michener.

The following key will separate the American species of the genus:

1. Entire body closely punctured; length about 9 mm. *Male:* Middle metatarsus broad, wider near base, and tapering apically; supraclypeal area yellow, and lateral face

marks extending above antennal sockets; hind tibial spurs not inserted beneath teeth. 2

—Body much more sparsely punctate, punctures of abdomen separated by five or more times their diameters; length about 7 mm. *Male*: Middle metatarsus slender, parallel sided; lateral face marks not extending above antennal sockets. 3

2. *Male*: Outer surface of hind metatarsus polished between the hairs; punctures of hind tibiae larger, the surface between them smooth; vertex shiny, with some fairly large, almost impunctate, smooth, areas. (East of Rocky Mountains) *steironematis*⁶

—*Male*: Outer surface of hind metatarsus dull, minutely roughened; vertex less shiny, with more punctures, the surface between them slightly roughened. *Female*: Unknown. (Washington State). *steironematis opaca*

3. *Male*: Hind tibial spurs not arising from beneath teeth; supraclypeal area black or with little yellow; lateral face marks reduced to short lines near sides of clypeus. *Female*: Pubescence of hind metatarsus largely black on outer side. *morcei*⁷

—*Male*: One or both hind tibial spurs arising beneath a tooth; supraclypeal area yellow; lateral face marks occupying entire space between clypeus and eye margin to a point above upper margin of clypeus. *Female*: Pubescence of hind metatarsus white. 4

4. *Male*: Outer hind tibial spur only arising beneath a tooth; lateral face marks ending about opposite middle of antennal sockets. *Female*: "Punctation, especially of scutel, sparse."⁸ *ciliata*⁹

—*Male*: Each hind tibial spur arising beneath a tooth; lateral face marks truncated and ending below the level of antennal sockets. *Female*: "Punctation, especially of scutel, dense."⁸ *patellata*¹⁰

⁶Robertson, 1891, Trans. Am. Ent. Soc., 18:63.

⁷Robertson, 1897, Trans. Acad. Sci. St. Louis, 7:338.

⁸Viereck, 1916, Hym. Connecticut, p. 720.

⁹Patton, 1880, Ent. Mon. Mag., 17:31.

¹⁰Patton, 1880, Ent. Mon. Mag., 17:33.

A NEW GENUS OF PERLIDÆ

BY NATHAN BANKS

Museum of Comparative Zoology, Cambridge, Mass.

The sternal structures of Perlidæ have not been investigated as fully as some other parts of their structure. In examining *Acroneuria* for some structure to distinguish the females from other Perlidæ, I noticed that in two of our species the grooves on the meso- and metasterna were different from other species of *Acroneuria*. In the figures I have shown the differences. In the typical *Acroneuria* the anterior grooves are widely divergent, in *A. pacifica* they are short and nearly parallel. This sternal difference is correlated with the broader ocellar triangle, and the position of the lateral bosses, as well as in the last segment of the male. I shall, therefore, make *A. pacifica* the type of a new genus.

Hesperoperla gen. nov.

Anterior meso- and metasternal grooves short and nearly parallel; the ocellar triangle plainly broader than long; the lateral bosses on a level with the anterior ocellus; in the male the last ventral segment has a nearly quadrangular boss instead of the usual elliptic or rounded one; in the fore wing the second anal vein is frequently forked (rarely in *Acroneuria*). In *Acroneuria* the ocellar triangle is as long as broad, and the lateral bosses are higher. In *Beloneuria* the anterior sternal grooves are somewhat as in *Hesperoperla*, but curve outward more, but not nearly as much as in *Acroneuria*; the lateral bosses are higher, although the ocellar triangle is broader than long; the peculiar structure of the last ventral segment of the male in *Beloneuria*, somewhat like that of some *Pteronarcys*, will readily distinguish this genus, as well as the irregular apical venation.

Genotype: *Acroneuria pacifica* Bks.

Hesperoperla obscura sp. nov.

In general structure much as in *H. pacifica*. Body brown to almost black, venter pale through the middle, some yellowish on head, anterior margin of head a little more projecting than in *H. pacifica*; sculpture of pronotum as in *H. pacifica*; last dorsal segment gently, evenly rounded; the ventral plate of female with a distinct median emargination.



Fig. 1. a—*Hesperoperla*, mesosternal grooves; b—*Hesperoperla obscura*, ventral plate; c—*Acroneuria*, mesosternal grooves.

Wings less distinctly yellowish than *H. pacifica*, venation similar.

Expanse 48 to 50 mm.

From Laggan, Alberta 22 July (Osburn coll.).

In *H. pacifica* Bks. the ventral plate of the female is rounded and entire; the head and pronotum more yellowish. Type, M. C. Z., no. 23223.

I believe that these grooves from the inner ends of the slits of the meso- and metanotum have an important bearing on the classification of the Perlidæ. They are present mostly in the old genus *Perla*, now much divided. In our fauna they are in *Perla*, *Acroneuria*, *Togoperla*, and *Banksiella*; in Asia they occur in *Tylopyge*, *Oyamia*, *Kaminuria*, *Mesoperla*, *Niponiella*, *Kalidasia*, and *Schistoperla*.

They are not present in *Isogenus*, *Clioperla*, *Hydroperla*, *Perlesta*, *Isoperla*, *Perlinella*, nor in *Paraperla* which I propose to put in a separate tribe, the *Isogenini*. They are not present in the *Cloroperlini* (*Alloperla* and *Chloroperla*), nor in the *Peltoperlini*, but are evident, though sometimes fainter, in the *Neoperlini*. The *Peltoperlini* have the middle part of the metasternum very much broader than in the other groups.

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